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N, N-DIMETHYLFORMAMIDE, A NEW DILUENT FOR BROMOFORM
USED AS A HEAVY LIQUIDNELSON HICKLING, FRANK CUTTITA AND ROBERT MEYROWITZ,
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N, N-Dimethylformamide (DMF), $\text{HCON}(\text{CH}_3)_2$, which has already been used as a diluent for methylene iodide (diiodomethane) in heavy liquid separations (Meyrowitz, *et al.* 1960), is recommended as a diluent for bromoform also. This diluent can be used in place of dimethyl sulfoxide (DMSO), $(\text{CH}_3)_2\text{SO}$, for the preparation of heavy liquids of constant specific gravity for the same range of specific gravity for which the dimethyl sulfoxide-bromoform liquids were recommended (Meyrowitz, *et al.*, 1959). This new diluent for bromoform is suggested only as an alternate to dimethyl sulfoxide. At present (1961) the dimethyl sulfoxide-bromoform and dimethylformamide-bromoform liquids are to be considered as equivalent and can be used interchangeably. Because one set of liquids may be chemically reactive to a particular mineral, it is well to have both diluents on hand for substitution when necessary.

The physical properties of dimethylformamide are similar to those of dimethyl sulfoxide (Meyrowitz, *et al.*, 1960). Its vapor pressure is low; its boiling and flash points are high; and it is completely miscible with water and acetone.

The combining volumes of dimethylformamide-bromoform solutions are additive and a straight-line mixing curve (volume+volume) can be used to prepare a liquid of desired specific gravity. Acetone, dimethylformamide, and water are miscible in all proportions. The separated minerals can be washed free of a dimethylformamide-bromoform liquid using acetone. The bromoform can be recovered from the washings by mixing the washings with large volumes of water in the manner conventionally used when alcohol or acetone is the diluent. When a dimethylformamide-bromoform solution, prepared for a specific job, is no longer needed, the bromoform can be recovered in the same way.

To test the constancy of the dimethylformamide-bromoform solutions during use, a series of solutions were prepared. During a 3 month period from 30 to 40 mineral separations were made with each liquid. The specific gravities of these liquids before and after the 3 month period are given below. There is a slight darkening in the color of these solutions after use. This color is lighter than that developed in the dimethyl sulfoxide-bromoform liquids after use.

<i>Specific gravity before use</i>	<i>Specific gravity after use (3 months later)</i>	<i>Change in specific gravity</i>
2.5584 (27° C.)	2.5560 (28° C.)	-0.0024
2.6000 (27° C.)	2.5954 (28° C.)	-0.0046
2.6866 (26.5° C.)	2.6883 (28° C.)	+0.0017
2.5804 (27° C.)	2.5739 (28° C.)	-0.0065
2.6460 (28° C.)	2.6449 (28° C.)	-0.0011

Precautions to be taken when using dimethylformamide have been mentioned in a previous paper (Meyrowitz, *et al.*, 1960).

REFERENCES

- MEYROWITZ, ROBERT, CUTTITTA, FRANK AND HICKLING, NELSON, 1959, A new diluent for bromoform in heavy liquid separation of minerals: *Am. Mineral.*, **44**, 884-885.
 MEYROWITZ, ROBERT, CUTTITTA, FRANK AND LEVIN, BETSY, 1960, N, N-Dimethylformamide, a new diluent for methylene iodide heavy liquid: *Am. Mineral.*, **45**, 1278-1280.

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THE CHALCOKYANITE SERIES

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In the table giving *x*-ray data for the chalcokyanite series (Strunz 1961), the data for CoSO_4 are those of the high temperature α -modification (Rentzeperis 1958), with space group *Pmnb*. Anhydrous CoSO_4 also has a low temperature β -modification isomorphous with MgSO_4 (Rentzeperis and Soldatos 1958), MnSO_4 (Rentzeperis 1958), FeSO_4 (Coing-Boyat 1959), and NiSO_4 (Dimaras 1957). The space group for this NiSO_4 series is *Cmcm*.

REFERENCES

- COING-BOYAT, J. (1959), *Acta Cryst.*, **12**, 939.
 DIMARAS, P. I. (1957), *Acta Cryst.*, **10**, 313.
 RENTZEPERIS, P. J. (1958), *Neues Jb. Mineral., Monatshefte*, **210**, 226.
 ——— AND SOLDATOS, C. T. (1958), *Acta Cryst.*, **11**, 686.
 STRUNZ, H. (1961), *Am. Mineral.*, **46**, 758.